Fig. 1

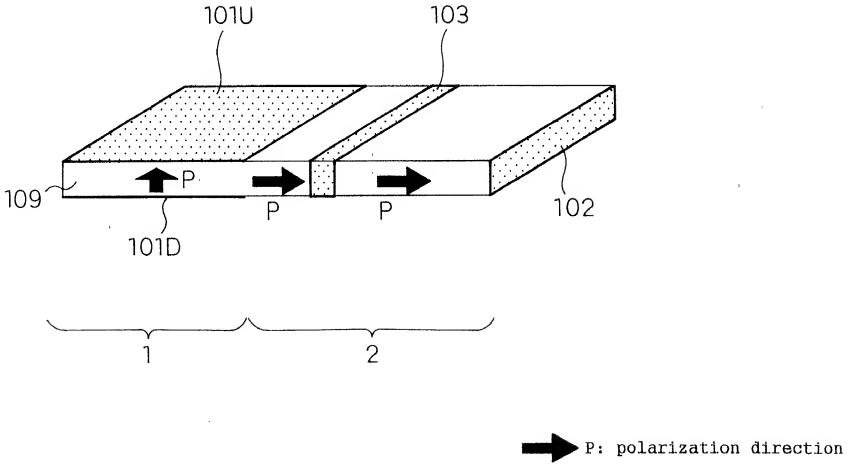


Fig. 2

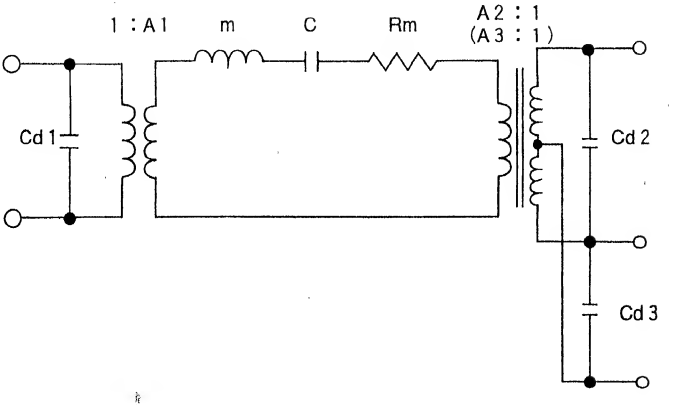


Fig. 3

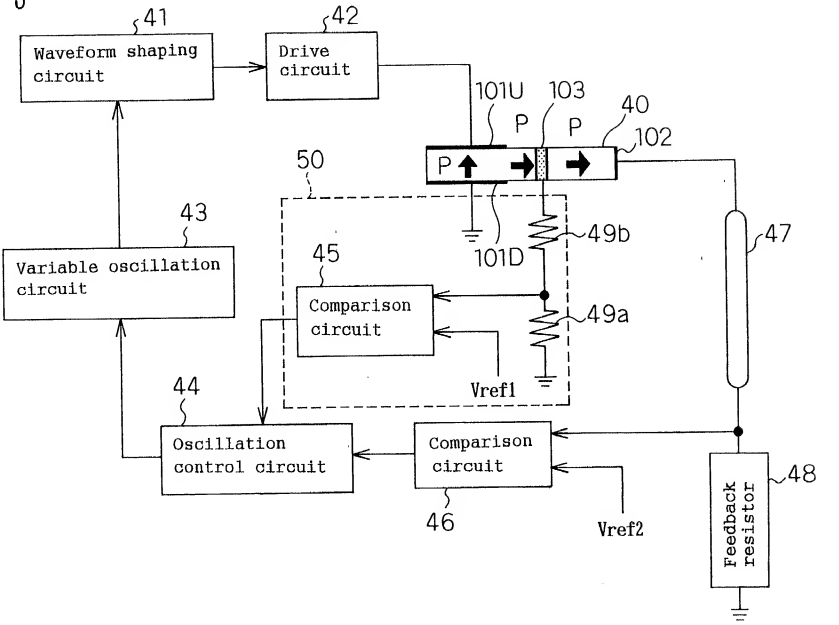

41
Waveform shaping circuit
42
Drive circuit
101U
103
P
P
40
102
50
P
43
Variable oscillation circuit
45
Comparison circuit
101D
49b
49a
47
Vref1
44
Oscillation control circuit
Comparison circuit
46
Vref2
Feedback resistor
48

Fig. 4 (a)

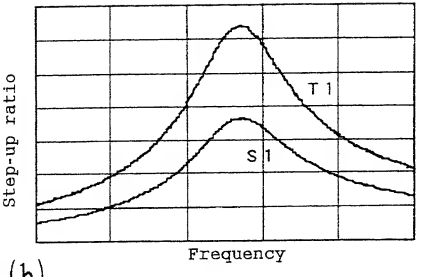


Fig. 4 (b)

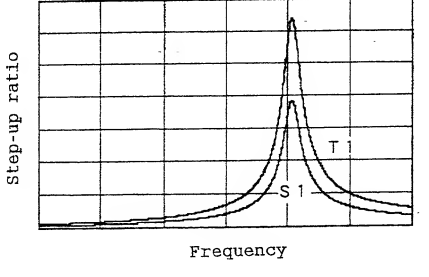


Fig. 5

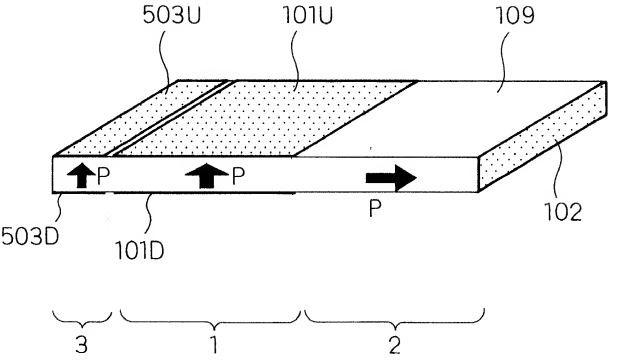


Fig. 6

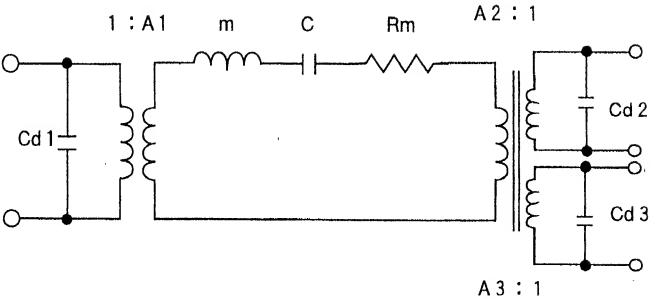


Fig. 7 (a)

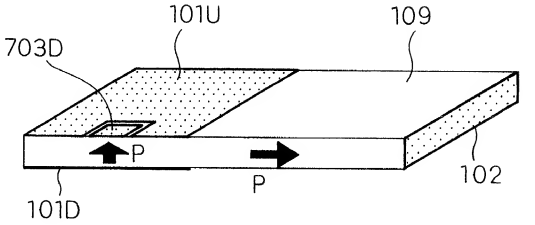
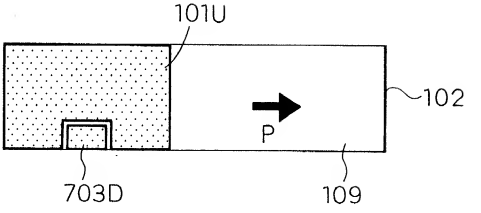


Fig. 7 (b)



P: polarization direction

Fig. 8

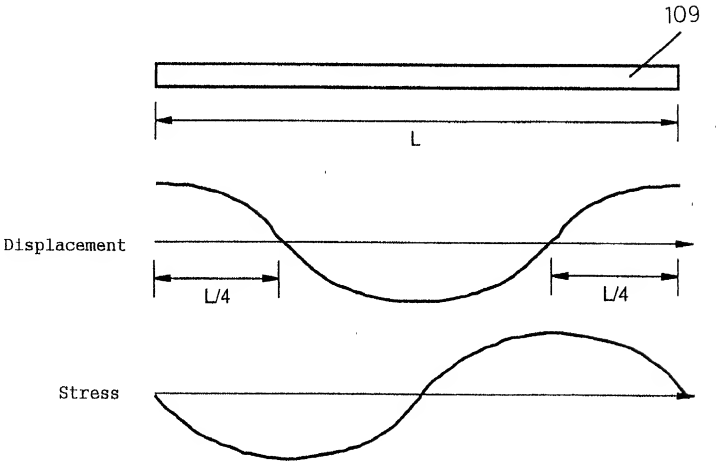
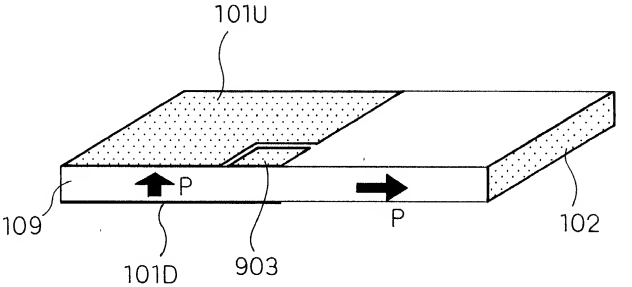


Fig. 9



P: polarization direction

Fig. 10

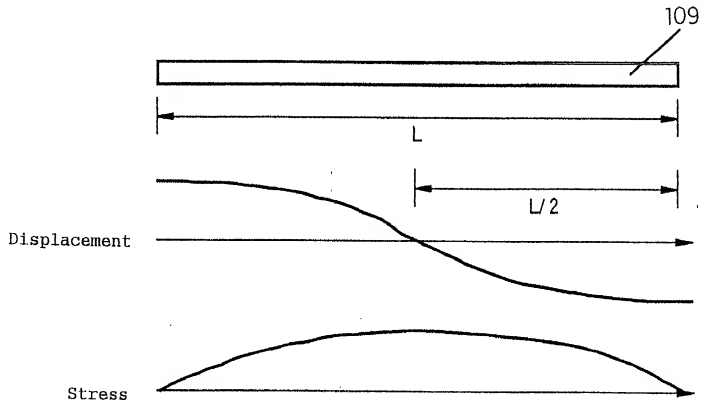


Fig. 11 (a)

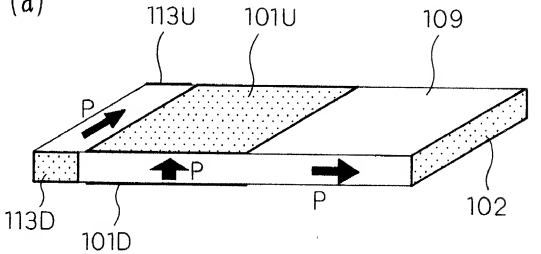
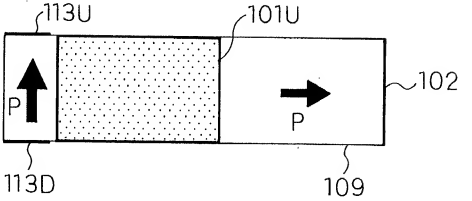


Fig. 11 (b)



P: polarization direction

Fig. 12 (a)

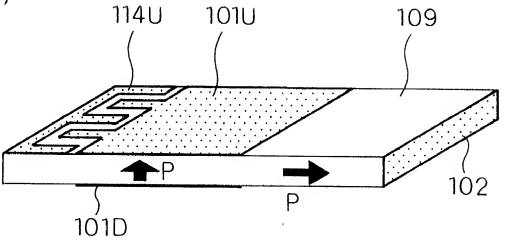
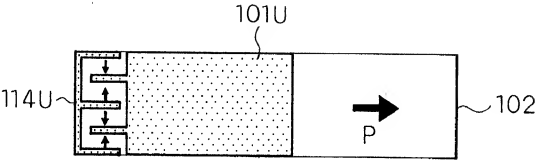


Fig. 12 (b)



P: polarization direction

Fig. 13(a)

Perspective view

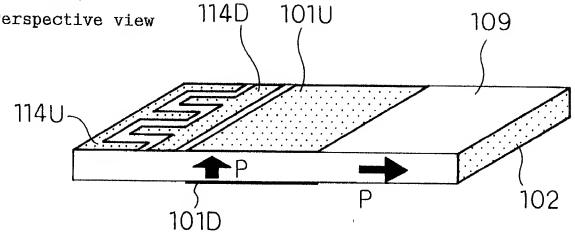


Fig. 13(b)

Top view

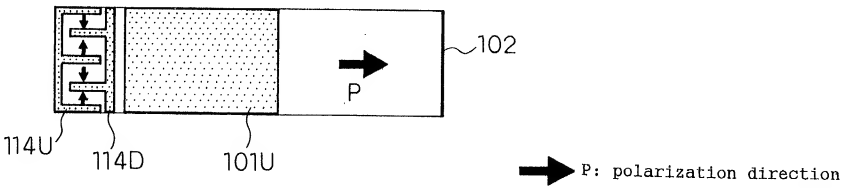


Fig. 14 (a)

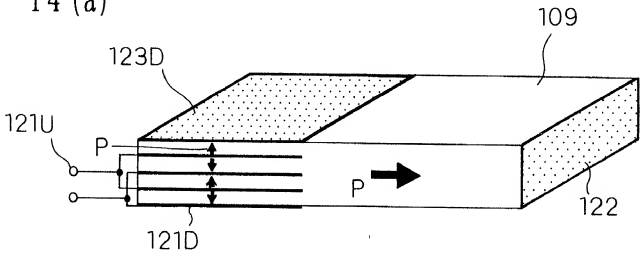
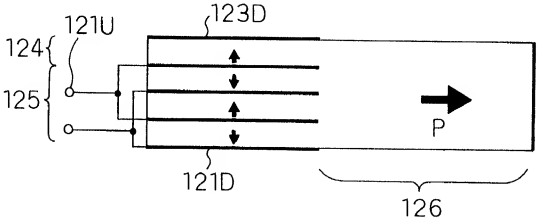


Fig. 14 (b)



P: polarization direction

Fig. 15

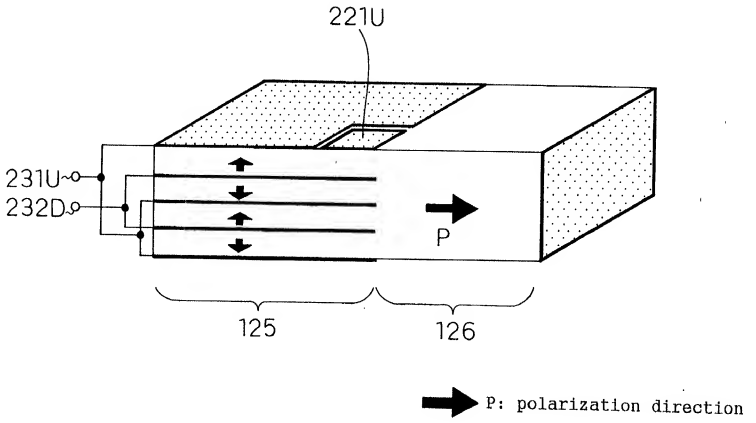


Fig. 16

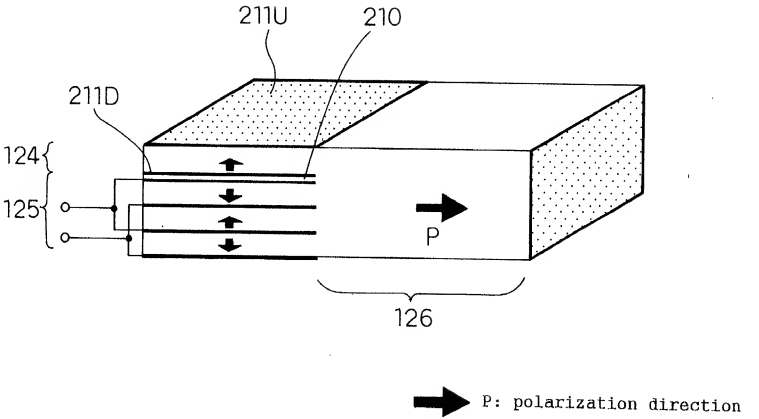


Fig. 17

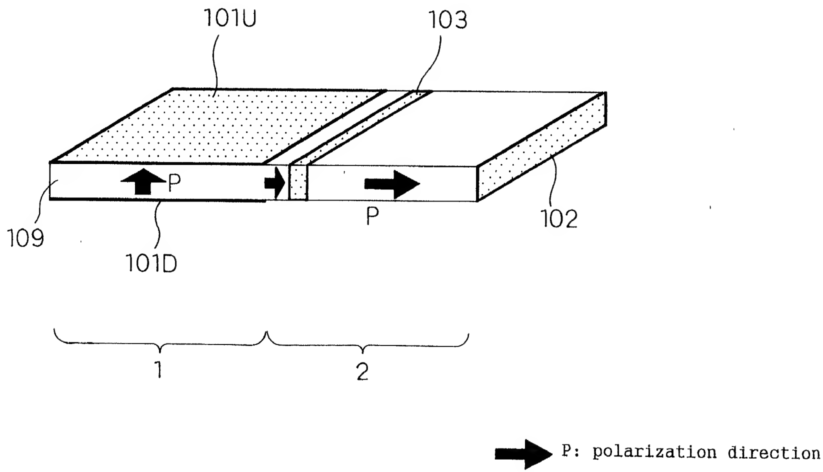


Fig. 18

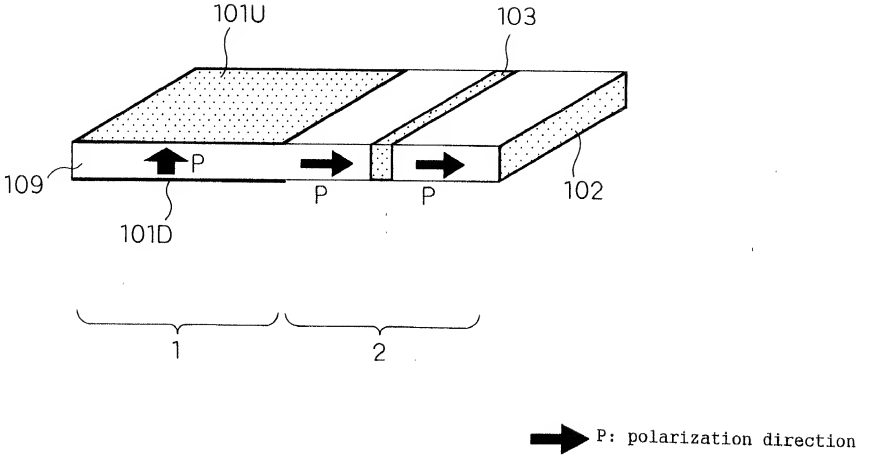


Fig. B1

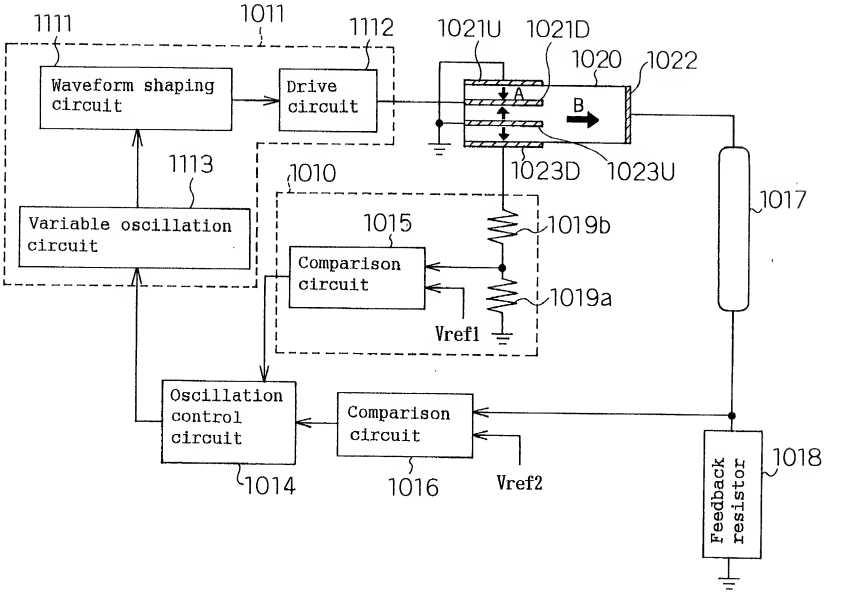

1111
1011
1112
1021U
1021D
1020
1022
Waveform shaping circuit
Drive circuit
A
B
1113
1010
1023D
1023U
1017
Variable oscillation circuit
1015
1019b
Comparison circuit
1019a
Vref1
Oscillation control circuit
Comparison circuit
1018
Feedback resistor
1014
1016
Vref2

Fig. B2 (a)

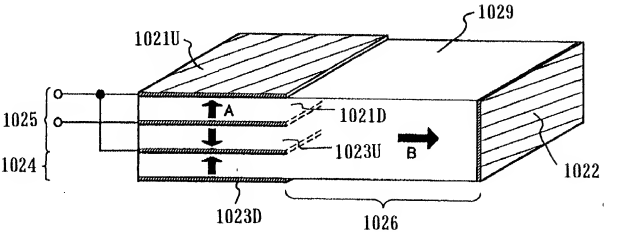


Fig. B2 (b)

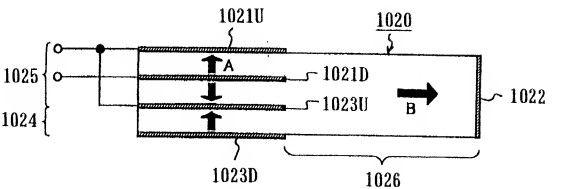


Fig. B3

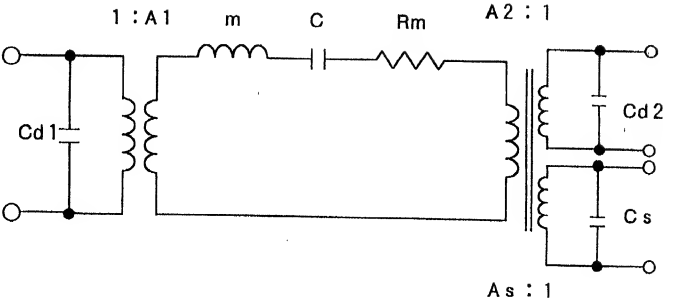


Fig. B4 (a)

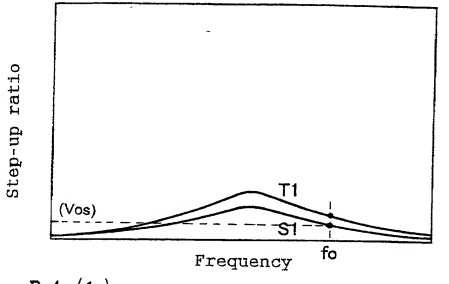


Fig. B4 (b)

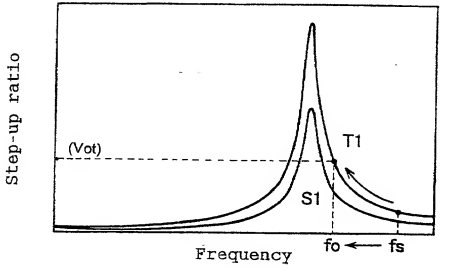


Fig. B5

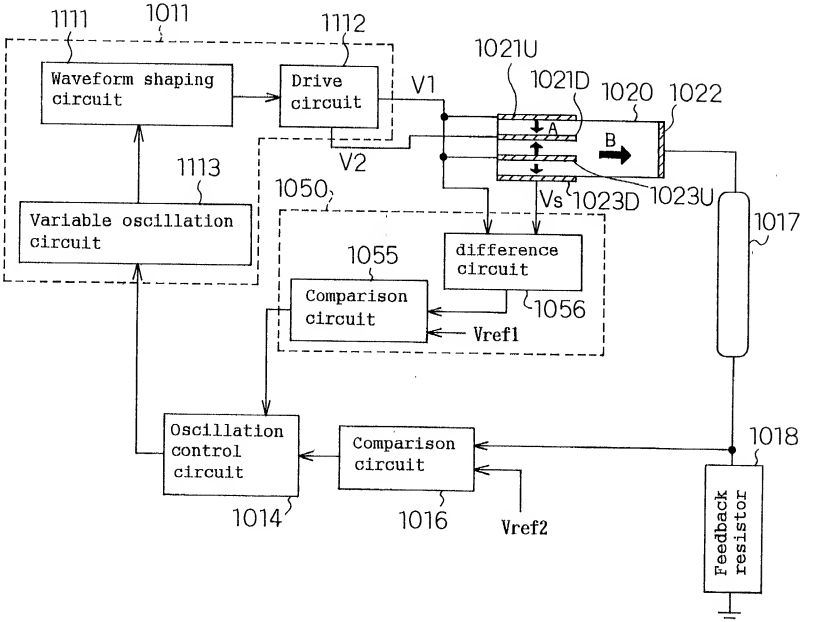


Fig. B6

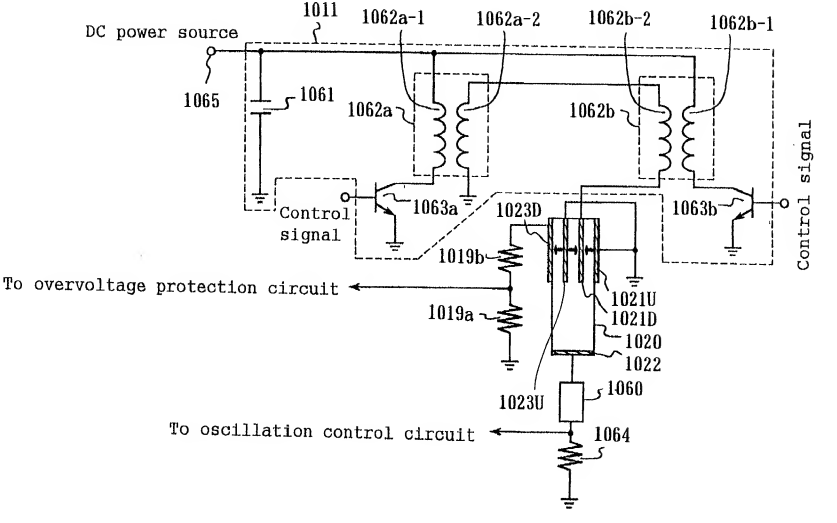


Fig. B7

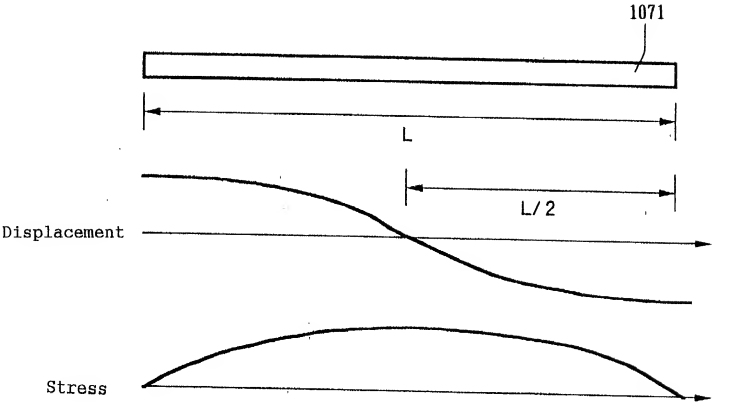


Fig. B8

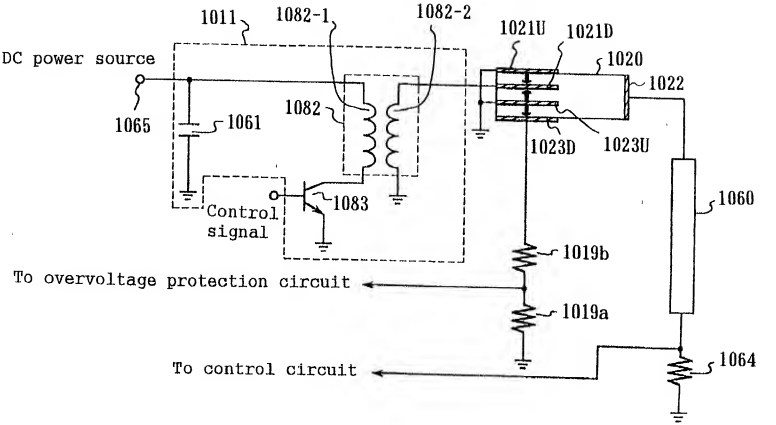


Fig. B9

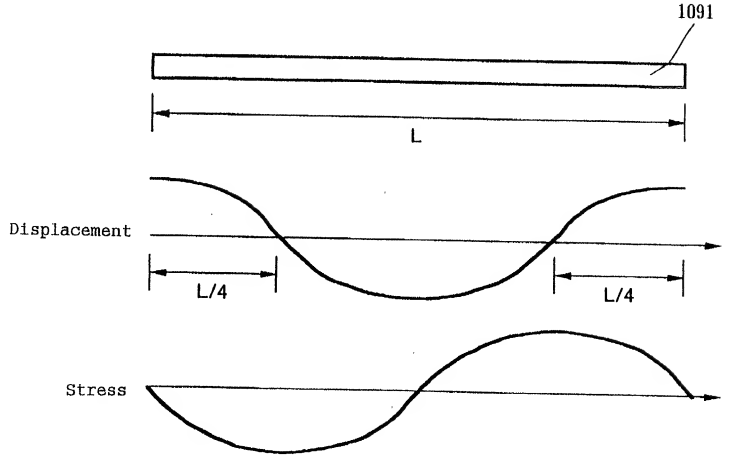


Fig. B10

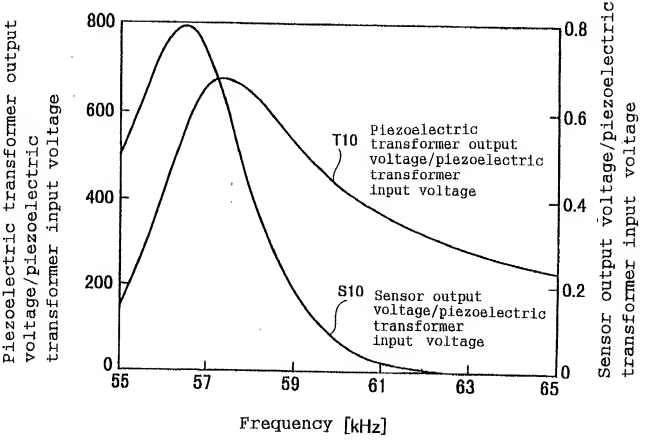

Piezoelectric transformer output voltage/piezoelectric transformer input voltage
800
600
400
200
0
0.8
0.6
0.4
0.2
0
55
57
59
61
63
65
Frequency [kHz]
T10
Piezoelectric transformer output voltage/piezoelectric transformer input voltage
S10
Sensor output voltage/piezoelectric transformer input voltage
Sensor output voltage/piezoelectric transformer input voltage

Fig. B11

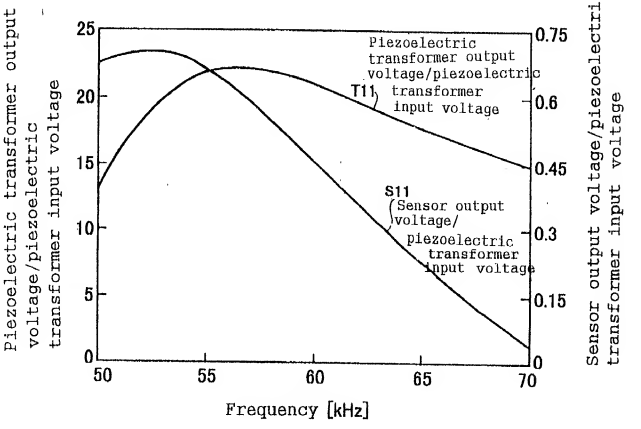

Piezoelectric transformer output voltage/piezoelectric transformer input voltage
25
20
15
10
5
0
50
55
60
65
70
Frequency [kHz]
0.75
0.6
0.45
0.3
0.15
0
Sensor output voltage/piezoelectric transformer input voltage
Piezoelectric transformer output voltage/piezoelectric transformer input voltage
T11
S11
Sensor output voltage/ piezoelectric transformer input voltage

Fig. B12

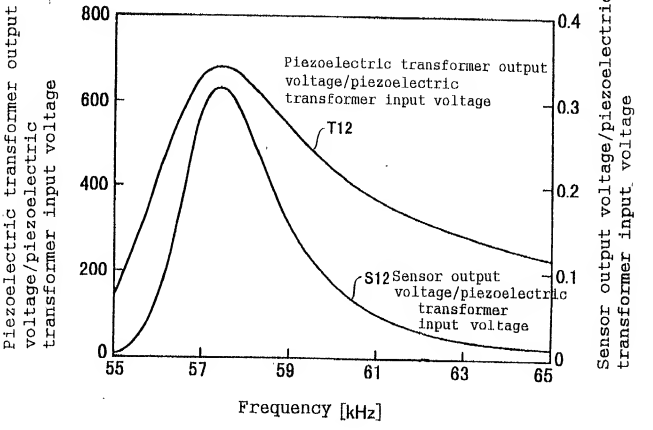


Fig. B13

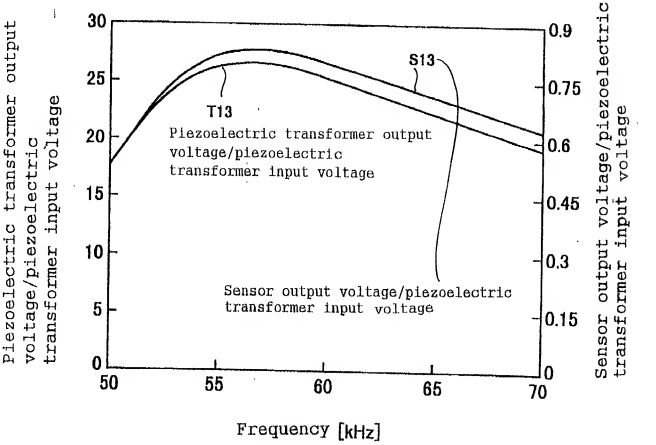
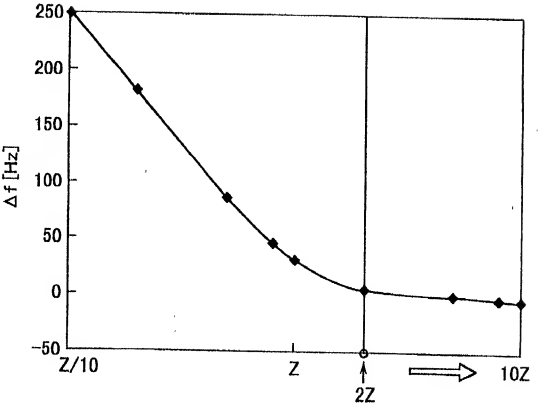


Fig. B14



Load of sensor electrode

wherein $Z=1/(\omega Cs)$

Fig. B15

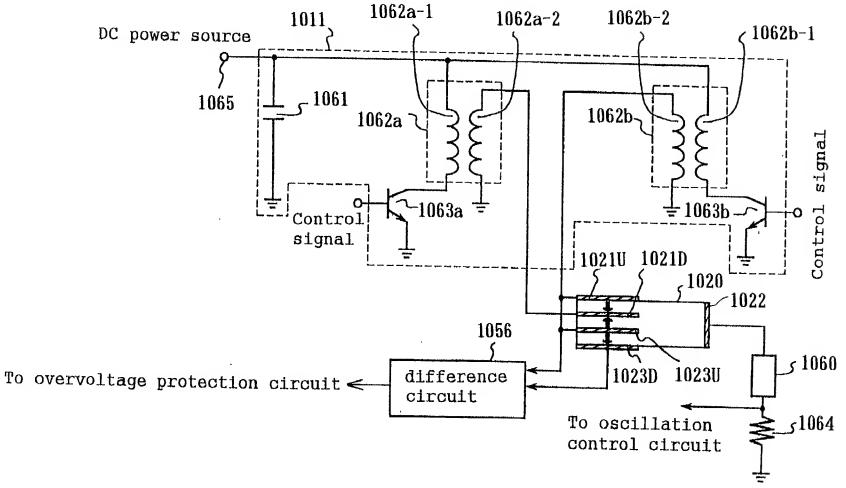

DC power source
1011
1062a-1
1062a-2
1062b-2
1062b-1
1065
1061
1062a
1062b
Control signal
1063a
1063b
Control signal
1021U
1021D
1020
1022
1056
1060
To overvoltage protection circuit
difference circuit
1023D
1023U
To oscillation control circuit
1064

Fig. B16

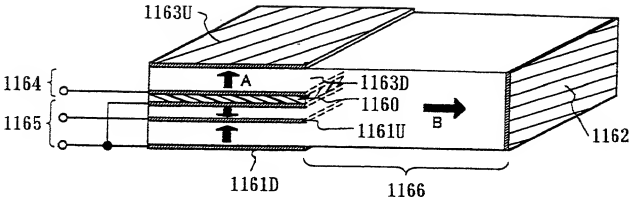


Fig. B17 PRIOR ART

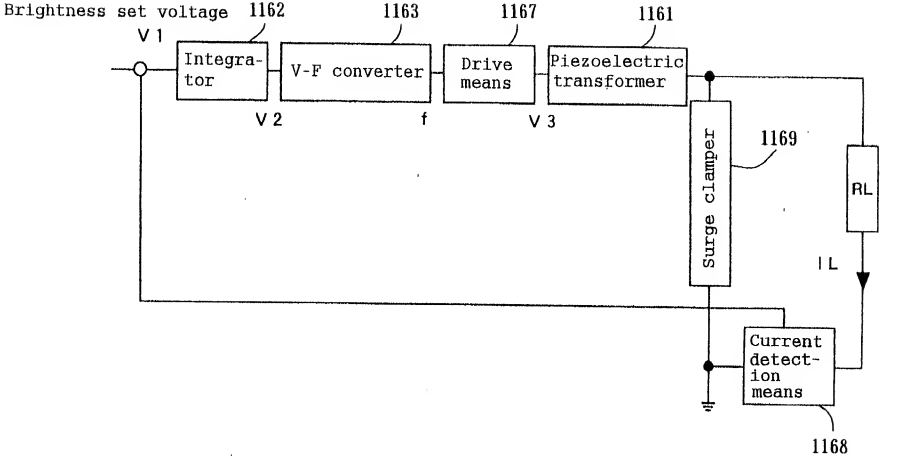


Fig. B18 PRIOR ART

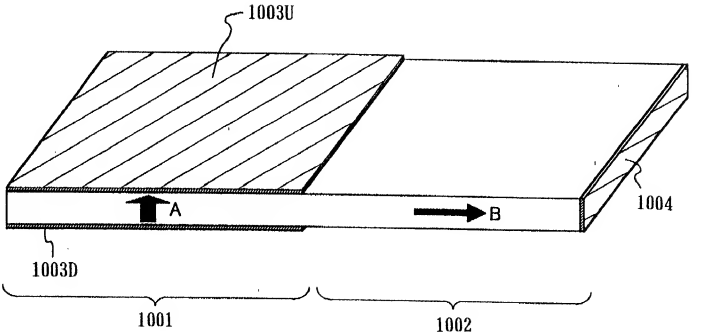


Fig. B19 PRIOR ART

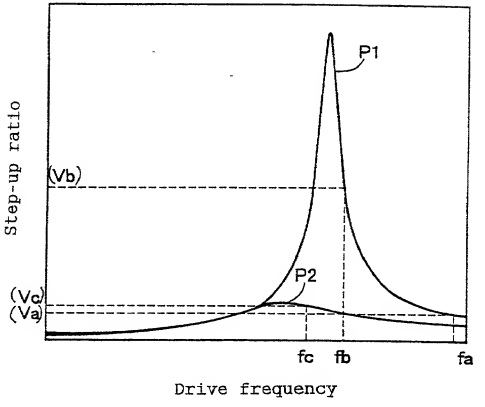


Fig. B20 PRIOR ART